A STUDY OF DERMATOSCOPIC FEATURES IN FACIAL MELANOSIS AND ITS CLINICAL CO-RELATION – AN OBSERVATION STUDY

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ABSTRACT

The studies have been conducted by recruited 118 cases of facial hypermelanoses among patients attending the outpatients department in Department of Dermatology. Bangalore medical college and research Institute. 30-45% of patients had 1-5 years duration of facial hypermelanosis. 31.40% of patients used facial cosmetics products regularly nearly 97.40% patients was found to be epidermal and or mixed type of pigmentation. Hem-Like pattern of pigmentation was seen in lichen planus pigmentosus and granular pigment net work was seen in 50% of the patients with ashy dermatosis. Duration of the facial melanosis have been effect on the pattern of pigmentation are it would be appears specific condition. Dermatoscopy is used assessment of the level of pigmentation.

KEYWORDS: Hypermelanoses, Pigmentation, Facial Cosmetics, Level of Pigmentation

INTRODUCTION

The Facial melanosis is a common presentation in Indian patients, causing cosmetic disfigurement with considerable psychological impact. Diagnosis is generally based on history & clinical features. There is considerable overlap in features amongst various clinical entities. More or less well-defined entities can be easily recognized, however many transitional forms defy classification. An enormous amount of interest worldwide is focused on resorting hyperpigmented skin to its natural colour by dermatologists. A dermatoscope is a diagnostic tool to visualise subtle clinical patterns of skin lesions and subsurface skin structures not normally visible to the unaided eye. It is a submacroscopic, quick and easy, non-invasive way to gain more information about morphology of skin lesions. The different dermatoscopic patterns observed consistently with certain diseases are useful to make a diagnosis and follow up the patient’s response to treatment. The facilities of storage of images with the results being immediately available are added advantages. Currently dermatoscopy is widely used for the diagnosis of pigmented and non-pigmented skin lesions in the investigative field of dermatology. The study aims to dermatoscopic features in various facial melanoses.

MATERIALS AND METHODS

Source of data: All newly diagnosed, untreated patients with facial melanoses attending Dermatology OPD of Victoria hospital, BMC&RI, Bangalore.

- **Inclusion Criteria**: Patients with facial melanosis of all age groups Patients who give consent
- **Exclusion Criteria**: Patients on treatment & with active infection
Patients to be enrolled in the study were requested to give consent to be part of the study. A questionnaire was administered to record the demographic details of patients including the age of onset, duration of disease, site of pigmentation, rate of progression, associated symptoms, and family history (Annexure-I). Information was also collected regarding any precipitating factors, use of cosmetics, drug intake prior to the onset, and associated cutaneous or systemic diseases. Local examination of the facial melanosis was done and a record was made of the morphology and distribution of lesions, extent of involvement and colour of pigmentation. Diagnosis of the causative condition was made based on history and clinical examination. Dermatoscopic features including colour, pigment pattern and background colour of the facial melanotic lesions were recorded and digital photographs taken. Following investigations were carried out: Wood’s lamp examination to determine the depth of pigmentation & Skin biopsy to confirm clinical diagnosis, if required. Obtained data were analyzed by using SAS-16.50 version. Univariate analysis was employed to draw the significant inference. The following characteristics definition defined.

Normal Skin Color

Among the substances contributing to the colour of the skin, melanin comprises the major part. The others include carotenoids, oxyhemoglobin and reduced haemoglobin.

Anatomy of Melanocytes

Melanocytes

Melanocytes are dendritic cells derived from the neural crest that are involved in pigment synthesis. They are found in the skin, eyes and ears.

Development

Melanocytes are derived from pluripotent neural crest cells that differentiate into numerous cell lineages, including neurons, glia, craniofacial bone, cartilage and melanocytes. Progenitor melanoblasts migrate dorsolaterally between the mesodermal and ectodermal layers to reach their final destinations in the hair follicles and the skin as well as inner ear cochlea, choroids, ciliary body and iris. Primitive melanocytes in the skin are first found during the fiftieth day of gestation. By the 10th week, these cells contain melanosomes showing early melanisation.

Structure

On light microscopy, melanocytes appear as clear cells in and beneath the basal row of the epidermis. The average number of melanocytes is one out of ten cells in the basal layer. The nucleus is smaller and more deeply basophilic than that of basal keratinocytes and the cytoplasm is dendritic. Melanocytes are in contact with keratinocytes through these dendritic processes.

By electron microscopy, a melanocyte is seen to contain numerous mitochondria, well-developed rough endoplasmic reticulum, prominent Golgi apparatus. Melanocytes have no tonofibrils or desmosomes. Abundant melanosomes in various stages of development are found in the cytoplasm.

Epidermal Melanin Unit (EMU)

Through their dendritic processes one melanocyte is in contact with 36 basal and suprabasal keratinocytes and this constitutes an epidermal melanin unit. Melanosomes are transmitted to keratinocytes through these dendritic processes.
Density of Melanocytes

The number of melanocytes per unit of surface area varies at different body sites. Melanocyte density/mm\(^2\) ranges from approximately 550 to >1200, with the highest concentrations found in the genitalia and face. There is no difference in the density of melanocytes in different races. They are distributed equally in number and symmetrically at a particular site in all races. The difference in the colour of skin among different races is due to amount of melanin produced and not to the number of melanocytes. In light skinned individuals, melanosomes are smaller and are present in cluster within the keratinocytes, whereas in individuals with darker complexion, melanosomes are larger, darker and are individually dispersed within the keratinocytes.\(^1\)

Melanisation

The major differentiated function of melanocytes is to synthesize melanin in specialised organelles within the melanocytes, the melanosomes and to transfer melanosomes to neighbouring keratinocytes to provide protection from UV irradiation. Pigmentation, the synthesis and distribution of melanin in the epidermis, involves several steps: transcription of proteins required for melanogenesis, melanosomes biogenesis, sorting of melanogenic proteins into the melanosomes and transfer of melanosomes to keratinocytes. Disruption in any of these events results in hyperpigmentation.

Melanosomes

The melanosomes is a unique membrane-bound organelle in which melanin biosynthesis takes place. Depending on the type of melanin synthesized, melanosomes can be divided into 2 types- eumelanosomes and pheomelanosomes. Eumelanosomes are large, elliptical in shape in which eumelanin synthesis takes place. Pheomelanosomes, in which pheomelanin is synthesized, are

Facial melanosis is a common presentation in Indian patients, causing cosmetic disfigurement with considerable psychological impact. Diagnosis is generally based on history & clinical features.

RESULTS

The following observations and results were obtained in this observational study which included 118 patients. The youngest patient was a 13 year old female and the oldest was 76 year old male with a mean of 40.39 years in our study. The maximum number of patients belonged to 31-40 years age group (35.6%), followed by 21-30 years (21.2%).

Technique of Dermatoscopy

Dermatoscopy can be done by either the non-contact or the contract technique. In the contact technique, the glass plate of the instrument comes in contact with the surface of the linkage fluid applied lesion. Contact plates are made of multi-coated silicone glass and are of different types. Graduated plates have inscribed scales for measuring the lesion, while non-graduated plates lack a scale. Small plates have a small contact area to facilitate use in difficult to access regions like the web spaces, flexures and for nail fold capillaroscopy. Contact plates are sterilized by using 2% glutaraldehyde, methylated spirit, boiling or autoclaving.
Types of Dermatoscope

Marghoob et al have exhaustively reviewed various models of dermatoscopy. Dermatoscopic instruments can be grouped as:

Dermatoscopes without Image Capturing Facility

A dermatoscope is a hand-held, otoscope-like instrument that lacks an inbuilt camera or any other image capture facility. Cameras can be attached to some of these instruments with an adaptor, e.g. DermoGenius Basic. Dermalite MS (multispectral) incorporates four different colored polarized light, viz. white, blue (surface pigmentation), yellow (superficial vessels), and red (deep pigment and vessels), to facilitate better visualization of skin structures based on the principle that, depth of penetration of light is proportional to the wavelength. Other models of this type are DELTA 10, Mini 2000 Dermatoscope, Episcope (1). Dermatoscopes with image capturing facility: These instruments have either an inbuilt image capture system or have a camera attached for dermatoscopic photography. Also, whole body photography (body mapping) is possible with an apparatus like Mole Max I. Other instruments of this category are Delta 20, Dermatoscope, Dermaphot, Dermlite Foto and Video episcope. A videodermatoscope (Video dermatoscope, VideoCap 100) has a high resolution camera fitted to the hand piece. The image is seen on the computer screen. Small videos can be taken with this instrument.

Dermatoscope with Image Capture Facility and Analytical Capability

These instruments are mainly used in western countries where the concern of melanomas is a driving force to improve dermatoscopes for clinical diagnosis and preoperative assessment of pigmented lesions. Archived images of the patient can be compared with new ones and any significant change in lesion produces different colour signals. An artificial neural network mechanism helps judge whether a melanocytic nevus is benign e.g. DermoGenius MoleMap, Fotofinder dermoscope, Molemax II.

Handheld Dermatoscope

The handheld dermatoscope (Heine delta 20) has 20X magnification and gives good pictures as it has a polarizing light source with a contact plate. It requires a special digital camera that is dedicated to the instrument. While doing the procedure, the images have to be viewed through the scope and not over a computer monitor. A simpler handheld dermatoscope (Heine mini 2000) is inexpensive but lacks polarized and ultraviolet light and allows for viewing of only surface features without any chance of recording them. A digital camera which fits on handheld dermoscopy instrument with the help of a photo adaptor ring (Heine delta 20) is used to capture images. This makes the instrument clumsy to handle.

Applications of Dermatoscopy

The application of dermatoscopy in the developed world has been for differentiation between melanoma and the various benign pigmented lesions of the skin including seborrheic keratoses, solar lentigo, simple lentigo, melanocytic naevi, and basal cell carcinoma. It can be equally well utilized to diagnose any other skin condition like psoriasis, lichen planus, dermatofibroma, Darier’s disease, cicatricial alopecia, seborrheic keratosis and urticarial vasculitis. Dermatoscopy has also been used to calculate the follicular density in the donor area before follicular unit hair transplantation, to monitor adverse effects of potent topical corticosteroids in psoriasis and to monitor response of lentigo
maligina to treatment with topical imiquimod.⁸ Many of the minor or benign skin lesions display distinctive pattern on dermatoscopy and with practice, this pattern recognition can be utilized for confirming clinical diagnosis of that condition.

**Dermatoscopic Patterns**

Various findings in dermatoscopy are due to some focal changes in skin or skin substructures or constellation of some features giving rise to a specific pattern. Both the normal and abnormal skin has some features as well as patterns. Colour and patterns are two parameters to be appreciated in dermatoscopy. Melanin is the most important pigment in dermining different structural and chromatic patterns. Depending on the location of the melanin in different layers of the skin different colours appear. Upper dermis (stratum corneum, stratum spinosum) – Black; Dermoeipidermal junction-light-to-dark brown; Papillary Dermis-slate blue (due to Tyndall effect)& Reticular Dermis – steel blue ³.

**Table 1: Dermatoscopic Patterns in Facial Melanoses and their Clinicopathologic Correlates**

<table>
<thead>
<tr>
<th>Dermatoscopic Pattern</th>
<th>Description</th>
<th>Histological Correlate</th>
<th>Clinical Correlate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal reticular pattern</td>
<td>Net like pattern of normal pigmentation- homogenous pigment lines and pale areas in between these lines Pigment pattern varies slightly according to the rete ridge pattern of various area</td>
<td>The reticulate pattern corresponds to the pigmentation of the keratinocytes along the rete ridges, the pale areas in between correspond to the papillary dermis</td>
<td>Normal skin</td>
</tr>
<tr>
<td>Accentuated pigment network</td>
<td>Darker pigment network observed over affected skin</td>
<td>Due to heavier pigmentation of basal layer</td>
<td>Addisonian pigmentation, Café au-lait macule</td>
</tr>
<tr>
<td>Pseudoreticular network over face (normal finding for the facial skin)</td>
<td>The reticular pattern is incomplete, irregular and blunted with large hypomelanotic areas</td>
<td>The pseudoreticular pattern corresponds to the blunted or absent rete ridges and the large hypomelanotic area are due to increased sebaceous units</td>
<td>Normal skin over face</td>
</tr>
<tr>
<td>Granular pigment network</td>
<td>Lines forming the pigment network is granular</td>
<td>Presence of melanophages in the dermis</td>
<td>Lichen planus pigmentosus, Ashy dermatosis, Post inflammatory hyperpigmentation</td>
</tr>
<tr>
<td>Blotches</td>
<td>Round-oval shaped pigmented masculines with irregular borders formed due to coalescent wider network of pigment</td>
<td>Foci of increased pigmentation of the basal layer cells at irregular intervals with widened rete</td>
<td>Becker’s naevus</td>
</tr>
<tr>
<td>Annular pattern</td>
<td>Annular or ring like configuration of oigement areas</td>
<td>Increased pigmentation of basal keratinocytes</td>
<td>Melasma</td>
</tr>
<tr>
<td>Arcuate pattern</td>
<td>Incomplete annular configuration of pigmented area</td>
<td>Increased pigmentation of basal keratinocytes</td>
<td>Melasma</td>
</tr>
<tr>
<td>Archiform structures</td>
<td>Crescent shaped dark brown colored pigmented macules</td>
<td></td>
<td>Exogenous Ochronosis</td>
</tr>
<tr>
<td>“Hem-like” pattern</td>
<td>Hyperpigmented dots and specks arranged in a hem-like” pattern</td>
<td>Distribution of melanophages along the superficial vascular plexus</td>
<td>Lichen planus pigmentosus</td>
</tr>
</tbody>
</table>

Normal skin over face – The reticular pattern is incomplete, irregular and blunted with large hypomelanotic areas as the rete ridges are not so long as to produce a pigment network pattern. The numerous pigment free terminal and vellus hair follicles, as well as the openings of sweat glands seen as broad mesh and holes on a background of diffuse pigmentation create a pseudoreticular network. The dermatoscopic diagnosis of pigmented skin lesions is based on both global and local features; global features account for the pattern while the local features are responsible for minor changes.⁸
Dermatoscopic Patterns in Facial Melanoses

**Melasma** – Reticular pattern is the global feature seen in all melasma lesions. Lesions show diffuse reticular pigmentation in various shades of brown sparing the follicles and sweat gland openings producing exaggerated pseudo network pattern with concave borders called the ‘jelly sign’. This network is superimposed by hyper pigmented granules, globules and blotches predominantly in perifollicular areas but sparing the follicles. Early (epidermal) melasma shows scattered islands of reticular network of light brown or tan colour with dark fine granules scattered on the surface.

Well defined small patches of melasma (epidermal) demonstrate diffuse blotchy brownish reticular pattern showing multiple granules and globules of dark brown colour superimposed on the reticulate pattern. Large patches of melasma, dark brown in colour (mixed melasma) show diffuse reticular pigmentation or blotches of irregularly shaped, dark brown or blackish pigmentation of various size. The surface of this pigmentation show varying morphologies like arcuate, star like, annular and honeycomb. Granules and globules of dark brown colour are also seen especially in perifollicular regions but sparing the follicles. Melasma with uniform skin involvement and no areas of sparing with dark brown to grey hyperpigmented lesions depending on the depth of the pigment location (dermal melasma) show grayish brown or grayish black pigmented specks or arcuate, star-shaped, honeycomb and annular structures mainly in perifollicular location but sparing the follicles. Early subtle cases of melasma can be detected on dermatoscopy. It can help in differentiating melasma and other conditions with facial hyperpigmentation, i.e. lichen planus pigmentosus, photomelanosis, seborrheic melanosis, nevus of ota, ochronosis, lentignies, freckles, etc. Doing dermatoscopy has prognostic significance since it helps in differentiating epidermal from dermal melasma, especially in dark skinned individuals in whom Wood’s lamp is of little help. Dermatoglyphy may help to monitor efficacy of therapy for melasma, and to pick up complications like atrophy, depigmentation, telangiectasias, exogenous ochronosis, steroid dermatitis, etc. Post inflammatory hyperpigmentation of face – Accentuation of normal pseudoreticular pattern with or without whitish irregular blotches is the usual feature. Blotches of various colours may coexist depending on the underlying condition. Exogenous ochronosis – Crescent shaped dark brown coloured pigmented macules (Archiform structures) are seen. Charlin et al in 2008 reported the dermatoscopic features as blue gray amorphous areas obliterating some follicular openings. Berman et al in 2009 reported as dark brown and globular like structures on a diffuse brown background. Gil et al 2010 added the findings of short, thin arciform and annular structures around follicular openings. Dermatoscopy from the areas of aviar like hyperchromic papules suspected of exogenous ochronosis shows

- Brown amorphous areas at times obliterating the follicular structures rather than just surrounding them.
- Multiple thick globular structures over melasma patch.
- Multiple short, thin arciform structures.
- Confetti like depigmentation seen as white dots and telangiectasias as red dots.

Ochronosis can be differentiated from melasma on histopathology and is characterised by yellow brown, banana shaped pigment fibres in dermis.

Dermatoscopy is valuable in early diagnosis of exogenous ochronosis which necessitates immediate discontinuation of hydroquinone, rather than increasing the concentration of hydroquinone.
Addisonian Pigmentation – Darker pigment network is observed over affected skin (accentuated pigment network)\(^7\)

Dermatoscopy of Ashy Dermatosis of Face shows accentuation of the uniform reticular pattern of pigment network. The pigmented lines which form the reticular pattern are more thickened than usual and the lines are granular rather than linear. Sometimes the granules appear to be superimposed on lines. The granules probably correlate with clusters of melanophages commonly found in the papillary dermis in this condition. The reticular pattern is complete at places, whereas at other places they disintegrate into more discrete speckled, granular, linear, angulated bluish gray deposits. Dermatoscopy of Lichen planus pigmentosus of face shows non-uniform accentuation of the reticul ar pattern, the quantity of pigment appears to be more at certain places than the other. Multiple bluish grey and brown granules and globules arranged in reticular fashion, with some whitish areas with follicular plugs are seen. Hyperpigmented dots and specks arranged in a “Hem-like” pattern is seen in LPP lesions over extremities. There is a tendency for the pigment to be deposited around the acrosyringial openings and around follicular openings. Ashy dermatosis and LPP have slightly different clinical presentations, without any specific differentiating histological features.\(^9\) Dermatoscopy thus has an important role to play in their diagnosis.

Table 2: Comparative Study of Dermatoscopic Features

<table>
<thead>
<tr>
<th>Findings</th>
<th>Ashy Dermatosis</th>
<th>Lichen Planus Pigmentosus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>Uniform accentuation of the reticular pattern</td>
<td>Reticular pattern not uniformly accentuated</td>
</tr>
<tr>
<td>Extremities</td>
<td>Normal deposition of pigment around acrosyringium is blunted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pigment granules deposited in a curvilinear pattern</td>
<td>Deposition of pigment around acrosyringium is accentuated Pigment granules deposited in a hem-like’ pattern</td>
</tr>
</tbody>
</table>

Acquired bilateral nevus of Ota-like macules (Hori’s nevus), and nevus of Ota show bluish grey reticular and globular pigmentation with some whitish areas, and areas of dark brown colour.

DISCUSSIONS

Hyperpigmentary disorders of face are of major concern in both fair skinned and dark skinned individuals in our country. A significant proportion of individuals are affected by facial hypermelanoses due to various clinical entities. Most of these disease entities have well defined clinical characteristics and hence can be diagnosed by detailed clinical examination with certain other aids like wood’s lamp examination. However there are certain group of facial melanoses which have clinically overlapping features and hence difficult to diagnose by routine methods. In such cases invasive procedure like punch biopsy is indicated to assist diagnosis. Dermatoscope is a simple, easy to handle instrument primarily used to differentiate benign pigmented skin lesions from malignant ones. It has not been routinely used to study facial melanoses. Very few published literature is available where dermatoscope has been employed to study facial melanoses. This study aims to introduce dermatoscopy in the routine diagnosis and follow up of facial melanosis.

Specific patterns of pigmentation as seen under dermatoscope in facial melanoses can serve as useful adjuncts to clinical diagnoses. Thus it can obviate the need of biopsy over face which is a cosmetically concerned area of the body and long waiting hours for histopathological examination reports. We studied 118 patients of facial hypermelanoses who attended outpatient Department of Dermatology at our hospital, Bengaluru to determine the various clinical features and
dermatoscopic features. The epidemiological, clinical and dermatoscopic features observed in our study are discussed and compared with the literature available.

**Age and Sex Distribution**

Amongst the 118 patients studied, majority of them belonged to age groups of 33-40 years of age (35.6%), and 21-30 years (21.2%). Females outnumbered males contributing to 64.4% of total number of cases. In the review article of Ana Perez et al\(^5\); it has been quoted that facial hypermelanoses is common in middle-aged women, and are related to endogenous (hormones) and exogenous factors (such as use of cosmetics and perfumes, and exposure to sun radiation) and also facial hypermelanoses causes significant cosmetic disability which may be the reason for slightly more number of female patients seeking medical advice.

**Duration of Disease and other Significant History**

Nearly 30% of patients suffered from long duration of facial melanoses (1-5 years), while 23.7% of patients had complaints of shorter duration (<6 months) of hyperpigmentation. Constituents of cosmetics have been frequently incriminated in the causation of facial hypermelanosis since the commonest site of affliction is face of women. In our study, 31.4% of patients gave history of regular usage of fairness creams like Fair n lovely, Vicco turmeric, Ponds cold cream etc. 24.6% of patients were on chronic systemic drug therapy (ex. Oral Thyroxine, hypoglycemics, Antihypertensives). 26.3% of our patients were suffering from systemic illnesses like hypothyroidism, diabetes mellitus, hypertension etc. hypothyroidism was most frequent amongst them. It has been quoted in the article by Neena Khanna, et al that Melasma is several times more commoner in patients with thyroid disease than in controls\(^4\). Out of 70 females of reproductive age group in our study, 47 patients had regular menstrual cycles, 5 patients had irregular menstrual cycles and 18 had attained menopause. 37 patients with melasma had regular menstrual cycles.

17 patients (i.e 14.4%) out of 118, gave a history of similar facial melanosis in the family, which is not in concordance with an earlier reported study, in which it varied from 20 to 70%. \(^{13,18}\) Out of 72 patients with melasma, 16 (22.2%) patients gave a positive family history.

**CLINICAL DESCRIPTION OF FACIAL MELANOSES**

**Colour of Pigmentation**

In our study, patients showed predominantly brown coloured melanosis (83%) which included various shades of brown – dark brown, light brown, orangish brown, reddish brown, indicating that excess melanin deposition was in basal and suprabasal layers of epidermis in majority of patients. Black coloured (superficial epidermal) pigmentation was seen in 13.6% of patients. Thus 96.6% of patients had epidermal and/or mixed type of pigmentation. Slate grey/bluish black (only dermal) pigmentation was seen in 3.4% (4) patients.

**Accentuation of Pigmentation under Wood’s Lamp Light**

Pigmentation was accentuated under wood’s lamp in 44.1% of patients while there was no accentuation seen in 55.9% of patients. Thus 44.1% patients had only epidermal type of pigmentation and 55.9% patients had mixed and/or dermal type of pigmentation.
Combining the clinical observation and accentuation of pigmentation as seen under wood’s lamp examination, we found that the epidermal type of pigmentation was seen in 44.1% patients, mixed type of pigmentation in 52.5% and only dermal type of pigmentation was seen in 3.4% of patients.

**Cause of Facial Melanosis**

The most common cause of facial hypermelanoses in our study was melasma, observed in 61% of cases, followed by post-inflammatory hypermelanoses (14.4%) and Photomelanosis (8.5%). Other causes were ashy dermatosis (5.1%) and

**CONCLUSIONS**

Most of the facial melanosis showed to be epidermal and or mixed type of pigmentation under dermatoscopy, with pure dermal type of pigmentation is frequently were seen. Duration of the facial melanosis have been effect on the pattern of pigmentation are it would be appears specific condition. Dermatoscopy is used assessment of the level of pigmentation

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